

WHAT IS CLAIMED IS:

1. A flexible thin film capacitor comprising a substrate formed of at least one selected from the group consisting of an organic polymer and a metal foil, and
5 an inorganic high dielectric film and metal electrode films formed on the substrate, the inorganic high dielectric film being interposed between the metal electrode films,
wherein the inorganic high dielectric film and at least one of the metal electrode films are formed in contact with an adhesive film on the substrate,
10 thereby being integrated with the substrate by the adhesive film.
2. The flexible thin film capacitor according to claim 1, wherein the adhesive film is a metal oxide adhesive film.
- 15 3. The flexible thin film capacitor according to claim 2, further comprising a metal adhesive film formed between the metal oxide adhesive film and the metal electrode films.
- 20 4. The flexible thin film capacitor according to claim 3, wherein the metal adhesive film is formed in a region except for a portion between the metal oxide adhesive film and the inorganic high dielectric film.
5. The flexible thin film capacitor according to claim 1, wherein the adhesive film comprises at least one metal selected from the group consisting of Cr,
25 NiCr, Ti, Co, Ge, Cu, Sn, Mo and W.
6. The flexible thin film capacitor according to claim 1, the substrate having a first main surface and a second main surface, wherein the inorganic high dielectric film and the metal electrode films are formed on the first main
30 surface of the substrate, and at least one of the metal electrode films is connected to a metal electrode film on the second main surface of the substrate via a through hole provided in the substrate.

7. The flexible thin film capacitor according to claim 1, the substrate having a first main surface and a second main surface, wherein the inorganic high dielectric film and the metal electrode films are formed on the first main surface of the substrate, and at least one of the metal electrode films is connected to a metal electrode film on the second main surface of the substrate via an end face of the substrate.
8. The flexible thin film capacitor according to claim 1, further comprising a protective film formed on the inorganic high dielectric film and the metal electrode films.
9. The flexible thin film capacitor according to claim 8, wherein the protective film is formed of at least one material selected from the group consisting of SiO_2 , Si_3N_4 , Ta_2O_5 , Al_2O_3 , a thermosetting resin, and an ultraviolet-curable resin.
10. The flexible thin film capacitor according to claim 1, wherein a thickness of the entire capacitor is not more than $300\mu\text{m}$.
11. The flexible thin film capacitor according to claim 1, wherein the substrate is an organic polymer substrate, and the organic polymer substrate is formed of at least one material selected from the group consisting of polyimide, polyamide, polyimide-amide, polyester and polysulfone.
12. The flexible thin film capacitor according to claim 1, wherein the substrate is a metal foil substrate, and the metal foil substrate is formed of stainless steel.
13. The flexible thin film capacitor according to claim 1, wherein the metal electrode film is formed of at least one material selected from the group consisting of Pt, Ag, Au, Cu, Ni, Al, Pd, Ru and Ir.

14. The flexible thin film capacitor according to claim 1, wherein the inorganic high dielectric film is formed of at least one material selected from the group consisting of SrTiO_3 , BaTiO_3 , PbTiO_3 , CaTiO_3 , and solid solutions thereof.

15. A method for producing a flexible thin film capacitor comprising:
forming a first metal electrode film, an inorganic high dielectric film and a second metal electrode film in this order on a substrate formed of at least one selected from the group consisting of an organic polymer and a metal foil, using respective masks;

wherein the first metal electrode film and the inorganic high dielectric film are formed in contact with an adhesive film on the substrate, thereby being integrated with the substrate by the adhesive film.

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16. The method for producing a flexible thin film capacitor according to claim 15, wherein the first metal electrode film, the inorganic high dielectric film and the second metal electrode film are formed in contact with an adhesive film, thereby being integrated with the substrate by the adhesive film.

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17. The method for producing a flexible thin film capacitor according to claim 15, wherein a metal oxide adhesive film is formed as the adhesive film, and a metal adhesive film is formed in a region where the first metal electrode film is to be formed on the metal oxide adhesive film.

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18. The method for producing a flexible thin film capacitor according to claim 15, wherein the metal electrode film is formed by at least one method selected from the group consisting of DC magnetron sputtering, RF magnetron sputtering, ECR magnetron sputtering, a CVD method and a vacuum evaporation method.

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19. The method for producing a flexible thin film capacitor according to claim 15, wherein the inorganic high dielectric film is formed by at least one method selected from the group consisting of RF magnetron sputtering, ECR magnetron sputtering, a CVD method and a sol-gel process.

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20. The method for producing a flexible thin film capacitor according to claim 15, wherein the inorganic high dielectric film is formed at a temperature up to 300°C.

10 21. The method for producing a flexible thin film capacitor according to claim 15, wherein the inorganic high dielectric film is formed at a deposition rate of not less than 10nm / min.

15 22. The method for producing a flexible thin film capacitor according to claim 15, wherein a metal oxide adhesive film is formed as the adhesive film by at least one method selected from the group consisting of RF magnetron sputtering, ECR magnetron sputtering, a vacuum evaporation method, a CVD method and a sol-gel process.

20 23. The method for producing a flexible thin film capacitor according to claim 15, wherein a metal oxide adhesive film is formed as the adhesive film by treating a metal film with a solution, and the metal film is formed by at least one method selected from the group consisting of DC magnetron sputtering, RF magnetron sputtering, ECR magnetron sputtering, a CVD method and a vacuum evaporation method.

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24. The method for producing a flexible thin film capacitor according to claim 23, wherein the solution is at least one selected from the group consisting of concentrated nitric acid, phosphoric acid, chloric acid and perchloric acid.

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25. The method for producing a flexible thin film capacitor according to

claim 15, wherein a metal adhesive film is formed as the adhesive film by at least one method selected from the group consisting of DC magnetron sputtering, RF magnetron sputtering, ECR magnetron sputtering, a vacuum evaporation method and a CVD method.

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26. The method for producing a flexible thin film capacitor according to claim 15, further comprising:

forming a peeling film on a base formed of at least one selected from the group consisting of an inorganic material and a metal material;

10 applying an organic polymer material onto the peeling film; and

curing the organic polymer material by a heat treatment or light irradiation, thereby forming the substrate formed of an organic polymer on the peeling film.

15 27. The method for producing a flexible thin film capacitor according to claim 26, wherein the organic polymer material is at least one liquid substance selected from the group consisting of thermosetting or photocurable polyimide, polyamide, polyimide-amide, polyester, epoxy resin, polyurethane, epoxy acrylate and polyacrylic ester.

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28. The method for producing a flexible thin film capacitor according to claim 26, wherein the peeling film is formed by at least one method selected from the group consisting of a vacuum evaporation method, sputtering, a CVD method and a sol-gel process.

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29. The method for producing a flexible thin film capacitor according to claim 26, wherein the peeling film is formed of at least one material selected from the group consisting of SiO_2 , Si_3N_4 and coating glass.

30 30. The method for producing a flexible thin film capacitor according to claim 26, further comprising peeling the organic polymer substrate from the base by using a liquid or gas peeling solvent.

31. The method for producing a flexible thin film capacitor according to claim 30, wherein at least one liquid solvent selected from the group consisting of hydrofluoric acid, sodium hydrofluorate, and concentrated
5 phosphoric acid is used as the peeling solvent.

32. The method for producing a flexible thin film capacitor according to claim 30, wherein a gas containing at least one gas selected from the group consisting of CF_4 and CHF_3 is used as the peeling solvent.

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33. The method for producing a flexible thin film capacitor according to claim 30, wherein a mixed gas containing CF_4 and H_2 is used as the peeling solvent.

15 34. The method for producing a flexible thin film capacitor according to claim 15, further comprising forming a protective film on the first metal electrode film, the inorganic high dielectric film and the second electrode film.

20 35. The method for producing a flexible thin film capacitor according to claim 34, wherein the protective film is formed by at least one method selected from the group consisting of a vacuum evaporation method, sputtering, a CVD method, a sol-gel process, screen printing and coating with a dispenser.